## CLAIM AMENDMENTS

1. (Previously Amended) A system for pumping or mixing a fluid in a vessel, comprising:

a magnetic pumping or mixing element for placement in the vessel;

at least one superconducting element for levitating said magnetic pumping or mixing element;

a wall defining a chamber around the superconducting element, said chamber thermally isolating the superconducting element from the vessel;

a cooling source thermally linked to said superconducting element;

a motive device for rotating said superconducting element.

2. (Original) The system for pumping or mixing a fluid according to claim 1, wherein the chamber is evacuated or insulated to minimize thermal transfer from said superconducting element to said wall and provide the desired thermal isolation.

3. (Original) The system for pumping or mixing a fluid according to claim 1, wherein said wall is the outer wall of a cryostat and said cooling source is a chamber in said cryostat holding a liquid cryogen.

4. (Original) The system for pumping or mixing a fluid according to claim 1, wherein said cooling source is a refrigerator.

5. (Original) The system for pumping or mixing a fluid according to claim 1, wherein said thermal linking is provided by a rod extending between said superconducting element and said cooling source.

6. (Previously Amended) The system for pumping or mixing a fluid according to claim 1, wherein said levitating magnetic pumping or mixing element further includes a first permanent magnet positioned adjacent to said superconducting element but external to said wall.

7. (Original) The system for pumping or mixing a fluid according to claim 6, wherein said magnetic pumping or mixing element further includes a second permanent magnet spaced from said first permanent magnet for forming a magnetic coupling with said superconducting element, whereby said magnetic coupling serves to transmit driving torque from said superconducting element to said magnetic pumping or mixing element.

8. (Previously Amended) The system for pumping or mixing a fluid according to claim 7, wherein said motive device for said superconducting element includes a motor.

10. (Previously Amended) The system for pumping or mixing a fluid according to claim 1, wherein said wall is below said magnetic pumping or mixing element and the vessel rests atop said wall.

11. (Original) The system for pumping or mixing a fluid according to claim 1, wherein a gap is provided between said superconducting element and an inner surface of said wall of approximately 0.01 to 5 millimeters.

12. (Previously Amended) The system for pumping or mixing a fluid according to claim 1, wherein the vessel includes an inlet and an outlet and said rotating magnetic pumping or mixing element includes at least one blade for creating a pumping action that forces fluid to move from said inlet to said outlet.

13. (Previously Amended) The system for pumping or mixing a fluid according to claim 1, wherein said vessel is completely sealed and said magnetic pumping or mixing element serves to mix the fluid only.

14. (Previously Amended) The system for pumping or mixing a fluid according to claim 1, wherein the vertical center axis of rotation of the magnetic pumping or mixing element is offset from the vertical center axis of the vessel.

15. (Original) The system according to claim 1, wherein the vessel is selected from the group consisting of an open-top container, a sealed container, a disposable container, a rigid container, a container having an inlet and an outlet, a hollow pipe and a flexible bag.

16. (Original) The system for pumping or mixing a fluid according to claim 1, wherein said superconducting element is supported by the wall defining said chamber, and wherein said chamber is in turn supported from a stable mounting structure by a bearing permitting rotational motion, said motive device rotating said wall and said superconducting element together.

17. (Original) The system for pumping or mixing a fluid according to claim 16, wherein the cooling source is a stationary container holding a cryogen, and the support for the superconducting element is provided by a thermal link rigidly connected to the wall and providing a dynamic thermal connection with the cooling source.

18. (Original) The system for pumping or mixing a fluid according to claim 16, wherein said motive device is a motor coupled to said wall by an endless belt, wherein said endless belt transfers the rotary motion produced by said motor to said wall to cause said

superconducting element to rotate.

19. (Original) The system for pumping or mixing a fluid according to claim 16, wherein said cooling source is coupled to and rotates with said wall.

20. (Original) The system for pumping or mixing a fluid according to claim 16, wherein the vessel is a centrifugal pumping head having an inlet substantially at the center of a vessel wall opposite the side of the pumping head positioned adjacent to said superconducting element.

21. (Previously Amended) The system for pumping or mixing a fluid according to claim 16, wherein said chamber housing said superconducting element is positioned below said magnetic pumping or mixing element in said vessel.

22. (Previously Amended) The system for pumping or mixing a fluid according to claim 16, wherein the vessel is supported by a stable support structure positioned between said superconducting element and said magnetic pumping or mixing element.

23. (Previously Amended) The system for pumping or mixing a fluid according to claim 16, wherein the magnetic pumping or mixing element includes first and second magnets having different polarities to create a non-symmetrical magnetic field with respect to an axis of rotation of said superconducting element.

24. (Previously Amended) The system for pumping or mixing a fluid according to claim 16, wherein the magnetic pumping or mixing element includes at least one low-profile rod carrying first and second magnets, wherein said rod is capable of being inserted in a

relatively narrow opening in the vessel.

25. (Previously Amended) The system for pumping or mixing a fluid according to claim 16, wherein the magnetic pumping or mixing element includes a pair of interconnected rods that are substantially orthogonal to each other in a nominal position with each rod carrying first and second magnets having the same polarities.

26. (Original) The system for pumping or mixing a fluid according to claim 25, wherein the rods are pinned together and are thus capable of rotating about a common center, wherein the rods can be rotated to a partially folded position for insertion through a narrow opening in a container.

27. (Original) The system for pumping or mixing a fluid according to claim 25, wherein at least one of the rods is formed of a flexible material and is thus capable of being deformed during insertion in the relatively narrow opening in the vessel.

28. (Original) The system for pumping or mixing a fluid according to claim 1, wherein said motive device is positioned adjacent to and on the same side of the vessel as the superconducting element.

29-36. (Cancelled)

37. (Original) The system for pumping or mixing a fluid according to claim 28, wherein the cooling source is a container of a liquid cryogen or a closed-cycle refrigerator.

38. (Original) The system for pumping or mixing a fluid according to claim 37,

wherein the cooling source is the liquid cryogen container and the chamber housing the superconducting element is evacuated and also houses the cooling source.

39. (Previously Amended) The system for pumping or mixing a fluid according to claim 1, further including a transmitter for transmitting a signal or receiver for receiving the signal, and wherein either said magnetic pumping or mixing element or the vessel includes one of the transmitter or the receiver and the other is positioned adjacent to said superconducting element, wherein the operation of said motive device is restricted until the signal generated by the transmitter is received by said receiver.

40. (Original) The system for pumping or mixing a fluid according to claim 28, wherein the vessel is a centrifugal pumping head having an inlet substantially at the center of a vessel wall opposite the side of the pumping head positioned adjacent to said superconducting element.

42. (Previously Amended) The system for pumping or mixing a fluid according to claim 1, wherein the vessel is a pipe, the superconducting element includes at least two superconducting members each thermally separated or isolated from the outer surface of the pipe, and said pumping or mixing element includes at least two levitation magnets, each corresponding to one of said at least two superconducting members, whereby said magnetic pumping or mixing element is levitated in said pipe as a result of the interaction between said superconducting members and the corresponding levitation magnets.

43. (Previously Amended) The system for pumping or mixing a fluid according to claim 42, wherein said magnetic pumping or mixing element further includes a plurality of alternating polarity driven magnets.

44. (Previously Amended) The system for pumping or mixing a fluid according to claim 43, wherein the motive device includes a bearing positioned outside of said pipe for rotatably supporting a driving magnet assembly carrying a plurality of alternating polarity driving magnets, a motor, and an endless belt for transmitting rotary motion from said motor to said driving magnet assembly, wherein the driving magnet assembly upon rotating creates a varying magnetic field that influences said driven magnets and causes said magnetic pumping or mixing element to rotate.

45. (Previously Amended) The system for pumping or mixing a fluid according to claim 43, wherein the motive device includes a winding positioned external to said pipe and a power supply for supplying an electrical current to said winding, wherein said winding creates an electrical field that causes said levitating magnetic pumping or mixing element to rotate in said pipe.

46. (Previously Amended) The system for pumping or mixing a fluid according to claim 1, wherein said pumping or mixing element includes at least one levitation-assist chamber for holding a substance that is lighter than the fluid in said vessel, whereby the chamber assists in levitating the magnetic pumping or mixing element in the fluid.

47.(Previously Amended) The system for pumping or mixing a fluid according to claim 1, wherein the motive device is a first motive device, and further including a second motive device for moving the superconducting element relative to the vessel, whereby effective, non-localized pumping or mixing action may be provided.

48. (Original) The system for pumping or mixing a fluid according to claim 47, wherein the second motive device is a linear motion device.

49. (Currently Amended) The system for pumping or mixing a fluid according to claim 47, wherein:

said superconducting element is supported by the wall defining said chamber, and wherein said chamber is in turn supported from a stable mounting structure by a bearing permitting rotational motion, said first motive device rotating said wall and said superconducting element together;

said first motive device is a motor coupled to said wall by an endless belt, wherein said endless belt transfers the rotary motion produced by said motor to said wall to cause said superconducting element to rotate; and

wherein the second motive device includes a support structure for supporting the wall, the stable mounting structure, and the motor and a linear motion device for moving the support structure to and fro relative to the vessel.

50. (Previously Amended) A system for mixing a fluid, comprising:

a vessel for holding the fluid;

a magnetic pumping or mixing element for positioning in said vessel;

a superconducting element for levitating and forming a magnetic coupling with said magnetic pumping or mixing element;

a housing defining a chamber around said superconducting element for thermally isolating said superconducting element from said vessel;

a cooling source thermally linked to said superconducting element; and

a motive device for rotating said superconducting element.

51. (Original) The mixing system according to claim 50, wherein said chamber surrounding said superconducting element is evacuated to minimize thermal transfer to said housing and provide the desired thermal isolation.

52. (Previously Amended) The mixing system according to claim 50, wherein said vessel includes an inlet and an outlet and said magnetic pumping or mixing element further includes at least one blade or vane for creating a pumping action that forces fluid to move from said inlet to said outlet.

53. (Original) The mixing system according to claim 50, wherein said vessel is completely sealed from the outside environment.

54. (Previously Amended) The mixing system according to claim 50, wherein said vessel and magnetic pumping or mixing element are disposable.

55. (Previously Amended) A system for pumping or mixing a fluid in a vessel positioned on a stable support structure, comprising:

a magnetic pumping or mixing element for placement in the vessel;

at least one superconducting element for levitating said magnetic pumping or mixing element;

a wall defining a chamber for thermally isolating the superconducting element from the vessel;

a cooling source thermally linked to said superconducting element in said chamber; and

a motive device for rotating said superconducting element and said wall together.

56. (Cancelled)

57. (Previously Amended) The system for pumping or mixing a fluid according to claim 55, wherein a thermal link to said cooling source extends at least partially through said chamber and directly supports the superconducting element, said wall defining said chamber is supported by a bearing permitting rotational motion, said motive device is a motor coupled to said chamber by an endless belt, and said endless belt transfers the rotary motion produced by said motor to said wall and said thermal link to rotate the superconducting element.

58. (Previously Amended) The system for pumping or mixing a fluid according to claim 55, wherein said cooling source contains a liquid cryogen and is attached to and rotates with said wall and chamber.

59. (Currently Amended) The system for pumping or mixing a fluid according to claim 55, wherein said ~~chamber housing said~~ superconducting element is positioned below said magnetic pumping or mixing element in said vessel.

60. (Previously Amended) The system for pumping or mixing a fluid according to claim 55, wherein said magnetic pumping or mixing element includes at least one blade or vane, whereby said blade or vane provides the desired pumping or mixing action when the pumping or mixing element is rotated.

61. (Previously Amended) The system for pumping or mixing a fluid according to claim 55, wherein said vessel is a centrifugal pumping head having an inlet and an outlet, wherein the rotation of said magnetic pumping or mixing element causes the fluid to move from the inlet to the outlet.

62. (Original) The system for pumping or mixing a fluid according to claim 61,

wherein the inlet is in a vessel wall of the pumping head opposite a side of the pumping head adjacent to the superconducting element.

63. (Previously Amended) The system for pumping or mixing a fluid according to claim 55, wherein the vessel is supported by a stable support structure positioned between said superconducting element and said magnetic pumping or mixing element.

64. (Previously Amended) The system for pumping or mixing a fluid according to claim 55, wherein the magnetic pumping or mixing element includes first and second magnets having different polarities to create a non-symmetrical magnetic field with respect to an axis of rotation of said superconducting element.

65. (Original) The system for pumping or mixing a fluid according to claim 55, wherein the vessel is selected from the group consisting of an open-top container, a sealed container, a container having an inlet and an outlet, a disposable container, a rigid container, a pipe, and a flexible bag.

66. (Previously Amended) The system for pumping or mixing a fluid according to claim 55, wherein the magnetic pumping or mixing element includes at least one low-profile rod carrying first and second magnets having the different polarities, said rod being capable of insertion in a relatively narrow opening in the vessel.

67. (Previously Amended) The system for pumping or mixing a fluid according to claim 55, wherein the magnetic pumping or mixing element includes a pair of interconnected rods that are substantially orthogonal to each other in a nominal position, each carrying first and second magnets having the same polarity.

68. (Original) The system for pumping or mixing a fluid according to claim 67, wherein the rods are pinned together and are thus capable of rotating about a common center, wherein the rods can be rotated to a partially folded position for insertion through a narrow opening in a container.

69. (Original) The system for pumping or mixing a fluid according to claim 67, wherein at least one of the rods is formed of a flexible material and is thus capable of deforming for insertion in the relatively narrow opening in the vessel.

70. (Previously Amended) A system for pumping or mixing a fluid in a vessel, comprising:

a magnetic pumping or mixing element for placement in the vessel;

a superconducting element for levitating said magnetic pumping or mixing element;

a wall defining a chamber around the superconducting element, said chamber thermally isolating the superconducting element from the vessel;

a cooling source thermally linked to said superconducting element;

a motive device for rotating said magnetic pumping or mixing element, wherein at least a portion of said motive device is positioned adjacent to and concentric with the superconducting element.

71. (Currently Amended) The system for pumping or mixing a fluid according to claim 70, wherein said superconducting element is annular and at least a portion of said motive device is ~~position~~ positioned in a center opening of the annular superconducting element.

72. (Original) The system for pumping or mixing a fluid according to claim 71, wherein a portion of the chamber defined by said wall is annular for receiving said annular superconducting element.

73. (Previously Amended) The system for pumping or mixing a fluid according to claim 72, further including a platform in said chamber for supporting the superconducting element, wherein the platform is thermally linked to the cooling source.

74. (Original) The system for pumping or mixing a fluid according to claim 73, wherein the chamber housing the superconducting element is evacuated and also houses a thermal link from the cooling source to the platform supporting the superconducting element.

75. (Original) The system for pumping or mixing a fluid according to claim 70, wherein the cooling source is a container of a liquid cryogen or a closed-cycle refrigerator.

76. (Original) The system for pumping or mixing a fluid according to claim 75, wherein the cooling source is a liquid cryogen container and the chamber housing the superconducting element is evacuated and also houses the cooling source.

77. (Previously Amended) The system for pumping or mixing a fluid according to claim 70, wherein said motive device includes a shaft carrying a plurality of alternating polarity driving magnets corresponding to a plurality of driven magnets on said magnetic pumping or mixing element, said driving magnets being received in a thermally separated or isolated bore formed by the wall defining the chamber around said superconducting element.

78. (Previously Amended) The system for pumping or mixing a fluid according to claim 77, wherein said magnetic pumping or mixing element comprises:

a levitation magnet corresponding in size and shape to the superconducting element;

at least two driven magnets having opposite polarities, said driven magnets being aligned with the corresponding driving magnets of said motive device,

whereby said levitation magnet levitates said pumping or mixing element while said driven magnets transmit rotary motion to said pumping or mixing element from said driving magnets.

79. (Original) The system for pumping or mixing a fluid according to claim 78, wherein said levitation magnet is annular.

80. (Previously Amended) The system for pumping or mixing a fluid according to claim 70, wherein said magnetic pumping or mixing element carries at least one blade or vane.

81. (Original) The system for pumping or mixing a fluid according to claim 70, wherein said chamber is evacuated or filled with an insulating material.

82. (Previously Amended) The system for pumping or mixing a fluid according to claim 70, wherein the vessel is a pipe, the wall defining the chamber thermally isolating the superconducting element is positioned inside of said pipe and includes a thermally separated or isolated bore for receiving a driven shaft carrying a plurality of alternating polarity driving magnets forming a part of said motive device and magnetically coupling with a plurality of corresponding driven magnets in or on said magnetic pumping or mixing

element.

83. (Previously Amended) A system for pumping or mixing a fluid in a vessel, comprising:

a magnetic pumping or mixing element for placement in the vessel;

at least one superconducting element for levitating said magnetic pumping or mixing element;

a wall defining a chamber around the superconducting element, said chamber thermally isolating the superconducting element from the vessel;

a cooling source thermally linked to said superconducting element;

a first motive device for rotating said magnetic pumping or mixing element or said superconducting element;

a second motive device for moving the superconducting element relative to the vessel,

whereby moving the superconducting element ensures that effective, non-localized pumping or mixing action is afforded by the levitating, rotating pumping or mixing element.

84. (Original) The system for pumping or mixing a fluid according to claim 83, wherein the second motive device is a linear motion device for moving the superconducting element to and fro.

85. (Currently Amended) The system for pumping or mixing a fluid according to claim 83, wherein:

said superconducting element is supported by the wall defining said chamber, and wherein said chamber is in turn supported from a stable mounting structure by a bearing

permitting rotational motion, said first motive device rotating said wall and said superconducting element together;

said first motive device is a motor coupled to said wall by an endless belt, wherein said endless belt transfers the rotary motion produced by said motor to said wall to cause said superconducting element to rotate; and

wherein the second motive device includes a support structure for supporting the wall, the stable mounting structure, and the motor, and a linear motion device for moving the support structure to and fro relative to the vessel.

86-93. (Cancelled)

94. (Previously Amended) A system for pumping or mixing a fluid in a vessel, comprising:

a magnetic pumping or mixing element for placement in the vessel;

at least one superconducting element for levitating said magnetic pumping or mixing element;

a cooling source thermally linked to said superconducting element;

a motive device for rotating one of said magnetic pumping or mixing element or said superconducting element,

wherein said pumping or mixing element includes at least one levitation-assist chamber for holding a substance that is lighter than the fluid in said vessel, whereby the chamber assists in levitating the magnetic pumping or mixing element in the fluid.

95. (Original) The system for pumping or mixing a fluid according to claim 94, wherein said substance is air.

96. (Previously Amended) The system for pumping or mixing a fluid according to claim 94, wherein said levitating magnetic pumping or mixing element further includes a first permanent magnet positioned adjacent to said superconducting element and a second permanent magnet spaced from said first permanent magnet for forming a magnetic coupling with a drive magnet forming a part of said motive device.

97. (Original) The system for pumping or mixing a fluid according to claim 96, wherein a shaft is provided for coupling said first and second permanent magnets together, wherein a levitation-assist chamber is provided around at least a portion of said shaft.

98-110. (Cancelled)

111. (Previously Amended) A method of levitating and rotating a magnetic pumping or mixing element for pumping or mixing a fluid, comprising:

placing the magnetic pumping or mixing element in the vessel;

levitating the magnetic pumping or mixing element using a superconducting element positioned in an evacuated or insulated chamber adjacent to the vessel and thermally linked to a cooling source; and

rotating the superconducting element to induce rotation in the magnetic pumping or mixing element in the vessel.

112. (Previously Amended) The method according to claim 111, further including the steps of placing said magnetic pumping or mixing element in the vessel prior to filling the vessel with a fluid, and after mixing or pumping is completed, disposing of said magnetic pumping or mixing element and vessel.

113. (Previously Amended) The method according to claim 112, including the step of completely sealing the vessel prior to rotating said magnetic pumping or mixing element.

114. (Previously Amended) The method according to claim 111, wherein the magnetic pumping or mixing element includes at least two magnets having different polarities to create a non-symmetrical magnetic field relative to an axis of rotation of said superconducting element.

115. (Previously Amended) The method according to claim 111, wherein the vessel is a flexible bag for containing the fluid, and the method further includes placing the pumping or mixing element in the flexible bag prior to filling the bag with the fluid.

116. (Currently Amended) A method of levitating and rotating a magnetic pumping or mixing element for pumping or mixing a fluid in a vessel, comprising:

placing a magnetic pumping or mixing element carrying first and second magnets having different polarities to create a non-symmetrical magnetic field in ~~a vessel~~ the vessel;

levitating the magnetic pumping or mixing element in the vessel using a superconducting element;

rotating the superconducting element to induce rotation in the pumping or mixing element.

117. (Currently Amended) A method of levitating and rotating a magnetic pumping or mixing element for pumping or mixing a fluid, comprising:

placing the magnetic pumping or mixing element in ~~the vessel~~ a vessel;

levitating the magnetic pumping or mixing element in the vessel using a

superconducting element; and

rotating the magnetic pumping or mixing element using a driving magnet positioned adjacent to and concentric with the superconducting element.

118-122. (Cancelled)

123. (Previously Amended) A method of levitating and rotating a magnetic pumping or mixing element for pumping or mixing a fluid in a vessel, comprising:

placing the magnetic pumping or mixing element in the vessel;

levitating the magnetic pumping or mixing element using a superconducting element positioned in an evacuated or insulated chamber adjacent to the vessel and thermally linked to a cooling source;

rotating the magnetic pumping or mixing element in the vessel; and

moving the superconducting element relative to the vessel,

whereby the rotating magnetic pumping or mixing element follows the movement of the superconducting element to ensure that effective, non-localized pumping or mixing action is provided.

124. (Previously Amended) The method according to claim 123, wherein the step of rotating the magnetic pumping or mixing element includes rotating the superconducting element, and wherein the step of moving the superconducting element includes moving the superconducting element to and fro relative to the vessel in a linear fashion.

125. (Previously presented) The pumping or mixing system of claim 1, wherein the pumping or mixing element is a magnetic bearing, impeller, rotor or other means for generating a pumping or mixing action in a fluid.

126. (Previously presented) The pumping or mixing system of claim 50, wherein the pumping or mixing element is a magnetic bearing, impeller, rotor or other means for generating a pumping or mixing action in a fluid.

127. (Previously presented) The pumping or mixing system of claim 55, wherein the pumping or mixing element is a magnetic bearing, impeller, rotor or other means for generating a pumping or mixing action in a fluid.

128. (Previously presented) The pumping or mixing system of claim 70, wherein the pumping or mixing element is a magnetic bearing, impeller, rotor or other means for generating a pumping or mixing action in a fluid.

129. (Previously presented) The pumping or mixing system of claim 83, wherein the pumping or mixing element is a magnetic bearing, impeller, rotor or other means for generating a pumping or mixing action in a fluid.

130. (Previously presented) The pumping or mixing system of claim 94, wherein the pumping or mixing element is a magnetic bearing, impeller, rotor or other means for generating a pumping or mixing action in a fluid.

131. (Previously presented) A system for pumping or mixing a fluid in a vessel, comprising:

a magnetic rotor or impeller for placement in the vessel, either before or after the fluid is introduced, said rotor or impeller including at least one pair of alternating polarity driven magnets;

at least one superconducting element for levitating said magnetic rotor or impeller and forming a magnetic coupling with said alternating polarity driven magnets;

a cryostat including an evacuated or insulated chamber in which the superconducting element is positioned, said chamber thermally isolating the superconducting element from the vessel;

a cooling source thermally linked to said superconducting element; and

a motive device for rotating said superconducting element to induce rotation in the levitating impeller or rotor via the magnetic coupling.

132. (Previously presented) The system of claim 131, wherein the cooling source is a refrigerator or a container of liquid cryogen.

133. (Previously presented) A system for pumping or mixing a fluid in a vessel, comprising:

a magnetic structure having an axially non-symmetric magnetic field for placement in the vessel;

at least one superconducting element for levitating said magnetic structure and forming a non-contact coupling with said levitating magnetic structure;

a cryostat including an evacuated or insulated chamber for thermally separating or isolating the superconducting element from the vessel and a cooling source thermally linked to said superconducting element; and

a motive device for rotating said superconducting element,

whereby the rotation of the superconducting element induces rotation in the magnetic structure which in turn pumps or mixes the fluid when present in the vessel.

134. (Previously presented) The system of claim 133, wherein the magnetic structure

includes at least two alternating polarity magnets held together or embedded in a matrix material.

135. (Previously presented) A system for pumping or mixing a fluid in a vessel, said system including at least one stable support structure, comprising:

a magnetic pumping or mixing element for placement in the vessel, said magnetic pumping or mixing element including at least two alternating polarity driven magnets creating an axially non-symmetric magnetic field;

at least one superconducting element for levitating said magnetic pumping or mixing element and forming a coupling therewith;

a cryostat including a wall defining a chamber around the superconducting element, said chamber thermally isolating the superconducting element from the vessel, said cryostat rotatably supported by a bearing assembly supported by the stable support structure;

a cooling source thermally linked to said superconducting element;

a motor coupled to said cryostat by an endless belt, wherein said endless belt transfers the rotary motion produced by said motor to cause said cryostat and hence said superconducting element to rotate.

136. (Previously presented) The system of claim 135, wherein the wall is an outer wall of the cryostat.

137. (Previously presented) The system of claim 135, wherein the cooling source is a refrigerator or a liquid cryogen container.

138. (Previously presented) The system for pumping or mixing a fluid according to claim 135, wherein the vessel is a pipe, the superconducting element includes at least two

superconducting members each thermally separated or isolated from the outer surface of the pipe, and said pumping or mixing element includes at least two levitation magnets, each corresponding to one of said at least two superconducting members, whereby said magnetic pumping or mixing element is levitated in said pipe as a result of the interaction between said superconducting members and the corresponding levitation magnets.

139. (Previously presented) A system for pumping or mixing a fluid in a vessel using a magnetic structure having an axially non-symmetric magnetic field for placement in the vessel, comprising:

at least one superconducting element for levitating said magnetic structure and forming a non-contact coupling with said levitating magnetic structure;

a cryostat including an evacuated or insulated chamber for thermally separating or isolating the superconducting element from the vessel and a cooling source thermally linked to said superconducting element; and

a motor coupled to said cryostat by an endless belt, wherein said endless belt transfers the rotary motion produced by said motor to rotate said cryostat and said superconducting element together,

whereby the rotation of the superconducting element induces rotation in the magnetic structure which in turn pumps or mixes fluid when present in the vessel.

140. (Previously presented) The system of claim 139, wherein the magnetic structure includes at least one impeller blade or vane.

141. (Previously presented) A system for pumping or mixing a fluid in a vessel, comprising:

a pumping or mixing element for placement in the vessel, said pumping or

mixing element including at least two driven magnets;

a superconducting element for levitating the pumping or mixing element;

a cooling source thermally linked to said superconducting element;

a rotary motive device including at least two driving magnets, each of which form a magnetic coupling with one of the driven magnets for transmitting torque to said magnetic pumping or mixing element, wherein at least a portion of said motive device is positioned adjacent to and concentric with the superconducting element.

142. (Previously presented) The system of claim 141, wherein the drive magnets and driven magnets have alternating polarities.

143. (Previously presented) A system for pumping or mixing a fluid in a vessel, comprising:

a pumping or mixing element for placement in the vessel, said pumping or mixing element including at least two driven magnets;

a cryostat including an evacuated or insulated chamber in which an annular superconducting element having a center opening is positioned, said chamber thermally isolating the superconducting element from the vessel;

a cooling source thermally linked to said superconducting element;

a motor having a rotating shaft for rotating at least two driving magnets positioned in the center opening of the annular superconducting element and hence adjacent to and concentric therewith, with each of the driven magnets forming a magnetic coupling with one of the driven magnets for transmitting torque to said magnetic pumping or mixing element.

144. (Previously presented) The system of claim 143, wherein the chamber holding

the annular superconducting element is annular and defines a bore or opening for receiving the at least two driving magnets.

145. (Previously presented) A system for pumping or mixing a fluid using a pumping or mixing element for placement in a vessel, said pumping or mixing element including at least two driven magnets, said system comprising:

a cryostat including an evacuated or insulated chamber in which an annular superconducting element having a center opening is positioned, said chamber thermally isolating the superconducting element from the vessel;

a cooling source thermally linked to said superconducting element;

a motor for rotating at least two driving magnets positioned in the center opening of the annular superconducting element and hence adjacent to and concentric therewith, with each of the driven magnets forming a magnetic coupling with one of the driven magnets for transmitting torque to said magnetic pumping or mixing element.

146. (Previously presented) The system of claim 145, wherein the motor includes a shaft that carries or supports the at least two driving magnets.

147. (Previously presented) A method of levitating and rotating a magnetic pumping or mixing element for pumping or mixing a fluid in a vessel, comprising the steps of:

levitating the magnetic pumping or mixing element in the vessel using an annular superconducting element having a center opening;

rotating the magnetic pumping or mixing element using a driving magnet structure positioned in the center opening of the superconducting element and magnetically coupled to the magnetic pumping or mixing element.

148. (Previously presented) The method of claim 147, further including the step of positioning the annular superconducting element in an evacuated or insulated chamber in a cryostat and cooling the annular superconducting element using a cooling source to hold the superconducting element at or below a transition temperature.

149. (Previously presented) The method of claim 147, further including the step of field cooling the annular superconducting element before levitating the magnetic pumping or mixing element.

150. (Previously presented) The method of claim 147, wherein the step of field cooling includes placing a charging magnet in proximity to the superconducting element while cooling the superconducting element to at or below a transition temperature.

151. (Previously presented) The method of claim 147, wherein the step of rotating includes forming a magnetic coupling between a pair of driving magnets and a pair of driven magnets on or in the pumping or mixing element and then rotating the pair of driving magnets.

152. (Previously presented) A method of levitating and rotating a magnetic pumping or mixing element for pumping or mixing a fluid, comprising:

placing the magnetic pumping or mixing element in the vessel;

levitating the magnetic pumping or mixing element using a superconducting element; and

forming a magnetic coupling between the pumping or mixing element and the superconducting element;

rotating the superconducting element to induce rotation in the magnetic

pumping or mixing element in the vessel as a result of the magnetic coupling.

153. (Previously Amended) The method according to claim 152, further including the steps of cooling the superconducting element in accordance with a field cooling protocol before levitating or rotating the pumping or mixing element and positioning the superconducting element in an evacuated or insulated chamber adjacent to the vessel.

154. (Previously presented) A method of levitating and rotating a magnetic pumping or mixing element for pumping or mixing a fluid in a vessel using an annular superconducting element, including one cooled to at or below a transition temperature in accordance with a field cooling protocol, comprising the steps of:

levitating the magnetic pumping or mixing element in the vessel using the superconducting element;

forming a magnetic coupling between a driving magnet structure positioned in a center opening of the annular superconducting element and the magnetic pumping or mixing element;

rotating the magnetic pumping or mixing element using the driving magnet structure.

155. (Previously presented) A method of levitating and rotating a magnetic pumping or mixing element for pumping or mixing a fluid in a vessel using a superconducting element, including one cooled to at or below a transition temperature in accordance with a field cooling protocol, comprising:

levitating the magnetic pumping or mixing element in the vessel using the superconducting element;

forming a magnetic coupling between the superconducting element and the

magnetic pumping or mixing element;

rotating the superconducting element.

156-160. (Cancelled)

161. (Previously presented) A system for intended use in pumping or mixing a fluid in a vessel using a rotor or impeller capable of producing a non-symmetrical magnetic field, comprising:

at least one superconducting element capable of being field cooled for levitating and coupling with the magnetic rotor or impeller;

a cryostat for receiving the superconducting element and capable of maintaining the superconducting element in a field cooled state while thermally isolating the superconducting element; and

a motor for rotating the superconducting element,

whereby the magnetic rotor or impeller may be rotated in the vessel in a non-contact fashion as a result of the combined levitational and rotational forces supplied by the superconducting element when field cooled.

162. (Previously presented) The system according to claim 161, wherein the cryostat includes an evacuated chamber in which the superconducting element is at least partially received.

163. (Previously presented) The system according to claim 161, wherein the motor rotates the cryostat and the superconducting element together.